

What is claimed is:

1. A method of designing a collimator array device in which a laser beam, having a feature of a Gaussian beam, emitted from an emitting side fiber array is collimated by an emitting side lens, the collimated laser beam is made incident upon an optical functional element and thereafter converged by a receiving side lens, and the converged laser beam is made incident upon a receiving side fiber array, comprising the steps of:

calculating a mean value L_a of the optical length L of the laser beam which passes from said emitting side lens through said receiving side lens;

obtaining two values of the distance d_0 between said emitting side fiber array and said emitting side lens in which the distance from said emitting side lens through the beam waist of the laser beam collimated by said emitting side lens is equal to $L_a / 2$; and

selecting the smaller value of said two obtained values.

2. A method of designing a collimator array device according to claim 1, wherein said emitting side lens and said receiving side lens are planar microlenses.

3. A method of designing a collimator array device according to claim 1 or claim 2, wherein said optical functional element varies the optical length L of said laser beam depending on the operation condition thereof.

4. A method of designing a collimator array device according to claim 1 or claim 2, wherein said optical functional element is an optical switch array for changing the channel between said emitting side fiber array and said receiving side fiber array.

5. A method of designing a collimator array device according to claim 1 or claim 2, wherein said optical functional element is a single optical demultiplexing filter or plural optical demultiplexing filters.

6. A collimator array device in which the laser beam, having the feature of Gaussian beam, emitted from an emitting side fiber array is collimated by an emitting side lens, the collimated laser beam is made incident upon an optical functional element and thereafter converged by a receiving side lens, and the converged laser beam is made incident upon a receiving side fiber array, wherein the distance d_0 between said emitting side fiber array and said emitting side lens is the smaller value of two values obtained based on a mean value L_a of the optical length L of the laser beam which passes from said emitting side lens through said receiving side lens.

7. A collimator array device according to claim 6, wherein said emitting side lens and said receiving side lens are planar microlenses.

8. A collimator array device according to claim 7, wherein one edge or two adjacent edges of said emitting side planar microlens and the receiving side planar microlens are fixed, so that said emitting side planar microlens and the receiving side planar microlens can expand or shrink in the same direction with regards to the optical axis in a case where thermal variation occurs, and the other portions are not fixed.

9. A collimator array device according to claim 7, wherein the end surface of said emitting side optical fiber and the end surface, contact therewith, of said emitting side planar microlens are polished to incline 2 to 10 degrees.

10. A collimator array device according to claim 6 or claim 7, wherein said optical functional element varies the optical length L of said laser beam depending on the operation condition thereof.

11. A collimator array device according to claim 6 or claim 7, wherein said optical functional element is an optical switch array for changing the channel between said emitting side fiber array and said receiving side fiber array.

12. A collimator array device according to claim 6 or claim 7, wherein said optical functional element is a single optical demultiplexing filter or plural optical demultiplexing filters.